AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (Currently Amended) An off-axis projection system for displaying an image on a display surface based on input image data, comprising:

an image processing unit for receiving the input image data representing, a two-dimensional array of pixels, and electronically warping the input image data, prior to projection, to generate two-dimensional electronically warped image data;

a projection light engine having a display device with means to modulate a two-dimensional array of pixels, said light engine being coupled to the image processing unit and adapted for receiving the electronically warped image data, modulating a two-dimensional warped image corresponding to the electronically warped image data on the display device, and projecting the two-dimensional warped image to create a projected image ~~that corresponds to the distortion-compensated image data~~; and,

an optical reflection assembly coupled to the projection light engine adapted to direct the projected image onto the display surface, said optical reflection assembly comprising at least one curved mirror,

wherein, the electronic warping is performed such that in the projected image on the display surface, optical and geometric distortions, including distortions caused in the light engine and the optical reflection assembly, are substantially eliminated.

2. (Canceled).

3. (Previously Presented) The projection system of claim 43, wherein the aspherical rotationally non-symmetric curved mirror has a small degree of horizontal convex curvature on an upper portion and a larger degree of horizontal convex curvature on a lower portion for reducing spatial distortion in the projected image on the display surface.

4. (Previously Presented) The projection system of claim 1, further comprising a corrector lens positioned in the optical path of the projected image between the projection light engine and the at least one curved mirror, said corrector lens being shaped to compensate for the defocusing caused by said at least one curved mirror.

5. (Currently Amended) The projection system of claim <u>43</u> ~~1~~, wherein the projection light engine comprises an aspherical rotationally non-symmetric lens being shaped to compensate for any defocusing caused by said at least one curved mirror.

6. (Original) The projection system of claim 1, wherein the image processing unit is adapted to scale the input image data to the aspect ratio and resolution of the projection light engine.

7. (Previously Presented) The projection system of claim 1, wherein said projection light engine comprises:

a light generator for generating a beam of light;

the display device positioned in front of the light generator; and

projection optics positioned in front of the display device for projecting and focusing the projected image.

8. (Previously Presented) The projection system of claim 7, wherein the projection optics includes a projection lens and wherein an optical axis of the projection lens is offset from an optical axis of the display device for adjusting the position of the beam of light from the light generator with respect to the on-axis direction of the path of the projected image in order to further compensate for keystone distortion and spot size in the projected image on the display surface.

9. (Previously Presented) The projection system of claim 7, wherein the projection optics includes a projection lens and wherein an optical axis of the projection lens is tilted from an optical axis of the display device for adjusting the position of the beam of light from the light generator with respect to the on-axis direction of the path of the projected image in order to further reduce spot size and improve MTF in the projected image on the display surface.

10. (Previously Presented) The projection system of claim 7, wherein the projection optics include a projection lens and wherein an optical axis of the projection lens is offset and tilted from an optical axis of the display device for adjusting the position of the beam of light from the light generator with respect to the on-axis direction of the path of the projected image in order to further compensate for keystone distortion and spot size in the projected image on the display surface.

11. (Original) The projection system of claim 7, wherein said light generator is an illumination subsystem, said display device is a micro-display based light modulating subsystem, and said optical assembly is an assembly of lens elements.

12. (Original) The projection system of claim 11, wherein the micro-display device is shaped to compensate for keystone and other spatial distortions.

13. (Withdrawn) The projection system of claim 1, wherein said optical reflection assembly additionally comprises a first flat mirror having a planar reflective surface that is placed within the optical path of the distortion-compensated optical image.

14. (Withdrawn) The projection system of claim 13, further comprising a second flat mirror, such that the optical path of the distortion-compensated optical image impinges onto the surface of the second flat mirror, reflects to the curved mirror and is then reflected from the surface of the curved mirror onto the surface of the primary flat mirror which finally directs the light rays to the display surface.

15. (Withdrawn) The projection system of claim 13, further comprising a second curved mirror, such that the optical path of the distortion-compensated optical image passes onto the surface of the second curved mirror, reflects from the surface of the curved mirror and then from the surface of the primary flat mirror.

16. (Original) The projection system of claim 1, wherein said image processing unit, projection light engine, and optical reflection assembly are adapted to operate in a rear projection configuration.

17. (Previously Presented) The projection system of claim 1, wherein the at least one curved mirror is replaced by a Fresnel mirror.

18. (Previously Presented) The projection system of claim 1, wherein the image processing unit comprises:

a luminance correction stage for adjusting pixel brightness in the input image data to produce luminance adjusted input image data; and,

an image warping stage connected to the luminance correction stage for receiving the luminance adjusted input image data and generating the two-dimensional electronically warped image data.

19. (Original) The projection system of claim 18, wherein the luminance correction stage individually processes different spectral passbands associated with the input image data.

20 (Original) The projection system of claim 18, wherein the image warping stage individually processes different spectral passbands associated with the luminance adjusted input image data.

21. (Currently Amended) An off-axis projection method for displaying an image on a display surface of an off-axis projection system based on input image data, comprising:

receiving input image data representing a two-dimensional array of pixels and electronically warping the image data, prior to projection, to generate ~~tow-dimensional~~ two-dimensional electronically warped image data;

providing a projection light engine having a display device with means to modulate a two-dimensional array of pixels, said light engine being adapted for receiving the electronically warped image data, modulating a two-dimensional warped image corresponding to the electronically warped image data on the display device, and projecting the two-dimensional warped image to create a projected image; and,

reflecting the projected image with an optical reflection assembly coupled to the projection light engine, the optical reflection assembly being adapted to direct the projected image onto the display surface, said optical reflection assembly comprising at least one curved mirror;

wherein, the electronic warping is performed such that in the projected image on the display surface, ~~the~~ optical and geometric distortions, including distortions caused in the light engine and the optical reflection assembly, are substantially eliminated.

22. (Canceled).

23. (Previously Presented) The projection method of claim 44, wherein the aspherical rotationally non-symmetric mirror has a small degree of horizontal convex curvature on an upper

portion and a larger degree of horizontal convex curvature on a lower portion for reducing spatial distortion in the projected image on the display surface.

24. (Previously Presented) The projection method of claim 21 further comprising directing the projected image through a corrector lens positioned in the optical path of the distortion-compensated optical image before the optical reflection assembly, said corrector lens being shaped to compensate for the defocusing caused by the at least one curved mirror.

25. (Previously Presented) The projection method of claim 21, further comprising directing the projected image through an aspherical rotationally non-symmetric lens being shaped to compensate for the defocusing caused by the at least one curved mirror.

26. (Previously Presented) The projection method of claim 21, further comprising:

generating a beam of light;

positioning the display device to produce the distortion-compensated optical image; and,

projecting and focusing the projected image.

27. (Previously Presented) The projection method of claim 26, further comprising shifting an optical axis of said display device with respect to an optical axis of a projection lens in order to further compensate for keystone distortion in the displayed optical image.

28. (Previously Presented) The projection method of claim 26, further comprising tilting an optical axis of said display device with respect to an optical axis of a projection lens in order to reduce de-focusing and improve MTF in a displayed image.

29. (Previously Presented) The projection method of claim 26, further comprising shifting and tilting an optical axis of said display device with respect to an optical axis of a projection lens in order to further compensate for keystone distortion, reduce de-focusing, and improve MTF in a displayed image.

30. (Previously Presented) The projection method of claim 26, further comprising positioning a light generator before the display device and an optical reflection assembly after the display device, wherein said light generator is an illumination subsystem, said display device is a micro-display based imaging subsystem, and said optical assembly is an assembly of lens elements.

31. (Withdrawn) The projection method of claim 21, wherein the method further comprises adding a first flat mirror to said optical reflection assembly wherein the first flat mirror has a planar reflective surface and is placed within the optical path of the distortion-compensated optical image.

32. (Withdrawn) The projection method of claim 31, wherein step (c) further comprises adding a second flat mirror to said optical reflection assembly, such that the optical path of the distortion-compensated optical image impinges onto the surface of the second flat

mirror, reflects onto the surface of the curved mirror and then onto the surface of the primary flat mirror.

33. (Withdrawn) The projection method of claim 31, wherein step (c) further comprises adding a second curved mirror to said optical reflection assembly, such that the optical path of the distortion compensated optical image impinges onto the surface of the second curved mirror, reflects onto the surface of the first curved mirror and then onto the surface of the primary flat mirror.

34. (Original) The projection method of claim 21, wherein the method further comprises operating the projection system in a rear projection configuration.

35. (Previously Presented) The projection method of claim 21, wherein the method further comprises using a Fresnel mirror in place of the at least one curved mirror.

36. (Previously Presented) The projection method of claim 21, further comprising:

adjusting pixel brightness in the input image data to produce luminance adjusted input image data; and,

warping the luminance adjusted input image data to generate the two-dimensional electronically warped image data.

37. (Previously Presented) The projection method of claim 36, further comprising individually processing different spectral passbands associated with the input image data.

38. (Previously Presented) The projection method of claim 36, further comprising individually processing different spectral passbands associated with the luminance adjusted input image data.

39 (Canceled).

40. (Canceled).

41. (Canceled).

42. (Canceled).

43. (Previously Presented) The projection system of claim 1, wherein said at least one curved mirror comprises an aspherical rotationally non-symmetric mirror having a vertically oriented concave surface and a horizontally oriented surface with a varying degree of concave or convex curvature on an upper surface that smoothly transitions to a varying degree of convex curvature on a lower surface for reducing spatial distortion in the projected image on the display surface, said at least one curved mirror being positioned in the optical path of the projected image emerging from a projection lens for producing the projected image with reduced distortion on the display surface.

44. (Previously Presented) The projection method of claim 21, wherein said at least one curved mirror comprises an aspherical rotationally non-symmetric mirror having a vertically

oriented concave surface and a horizontally oriented surface with a varying degree of concave or convex curvature on an upper surface that smoothly transitions to a varying degree of convex curvature on a lower surface for reducing spatial distortion in the projected image on the display surface, said at least one curved mirror being positioned in the optical path of the projected image emerging from a projection lens for producing the projected image with reduced distortion on the display surface.